



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Akinari SUGIYAMA, et al.

Serial No.: 10/593,322      Group Art Unit: 1621

Filed: September 18, 2006      Examiner: NWAONICHA, Chukwuma O

For: METHOD FOR PRODUCING FLUORINE-CONTAINING HALIDE

DECLARATION

Commissioner for Patents

P.O. Box 1450

Alexandria VA 22313-1450

Dear Sir :

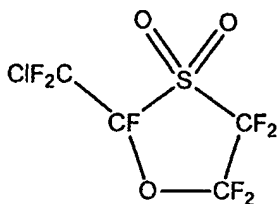
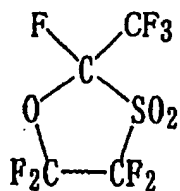
I, Akinari SUGIYAMA, hereby declare:

- 1) That I am one of the inventors of the instant invention, and
- 2) That the experiments given below were carried out under my general direction and supervision.

Experiment 1

A 100 ml four-necked flask was charged with 21.3 g (507.1 mmol) of NaF and 30.0 g of sulfolane as a solvent. The flask was subsequently equipped with a Liebig condenser to construct a system for withdrawing the product. The product was trapped by cooling with dry ice/acetone.

The above-mentioned flask was charged with 52.7 g (177.7 mmol) of  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{SO}_2\text{Cl}$ , and the contents were reacted by heating to 73°C. The distillate was analyzed using  $^{19}\text{F}$ -NMR. As a result, the  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{SO}_2\text{Cl}$  conversion was 68.8%, and the  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{SO}_2\text{F}$  yield was 51.4%. The main by-products were the cyclic compounds shown below, and no product formed by the  $\text{SO}_2$  removal reaction was detected.



The above results confirmed that the reaction of NaF, which is an alkali metal fluoride, with  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{SO}_2\text{Cl}$  produces little product formed by the  $\text{SO}_2$  removal reaction, and mainly produces  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{SO}_2\text{F}$ .

\* \* \* \* \*

I, the undersigned, declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: June 11, 2009

Akinari Sugiyama  
Akinari SUGIYAMA